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Topic A.—A preliminary report on this topic has been submitted to Professor Young by Mr. J. A. Foberg. This report was drawn up by a sub-committee of a committee of the Central Association of Science and Mathematics Teachers. A discussion of this topic has also been secured at the request of Professor Young from Professor Hedrick. Certain other preliminary material is expected soon and it is hoped that a report may be made to the committee within the next few months.

Topic B.—Professors Tyler and Smith are coöperating on a report which, it is expected, will be ready some time in December.

Topic C.—Miss Blair submitted a report on her topic last summer and is now engaged in a revision and expansion of it with a view to early publication.

Topic E.—Professor Crathorne submitted an extensive summary of the results of recent scientific, statistical investigations relating to mathematical requirements last spring and submitted a second report during the summer, suggesting that the committee carry out certain specific investigations of its own. At its meeting in Cleveland last September it was decided to carry out the work suggested by Professor Crathorne. It is hoped that a detailed account of the nature of the proposed investigation can be published in an early number of the MONTHLY.

Topic G.—Responsibility for this topic will be assigned in the near future.

This indicates in broad outline the larger phases of the committee's work. Many matters of more special interest have been before the committee during the past year but hardly seem to call for comment here. It is hoped that further information concerning the work of the committee may be published as occasion arises in future numbers of the MONTHLY.

BOOK REVIEWS.

SEND ALL COMMUNICATIONS TO W. H. BUSSEY, University of Minnesota.

Introduction to the Calculus of Variations. By WILLIAM ELWOOD BYERLY. Harvard University Press, Cambridge, 1917. 48 pages.

Having just finished using this little book as a basis of instruction in a short course in advanced calculus given during the summer session, we venture to give expression to our sentiments regarding it.

In the first place, we believe that any book on an advanced mathematical topic may be called good for one or the other of two reasons: either it is good because of the depth and rigor of its scholarship or it is good from the fact that, though written quite regardless of the "fine points," it somehow meets very squarely the actual needs of the great majority of our advanced students as we find them in our ordinary American university classes to-day. It might seem that these two types should be the same, but they are not. It is of course highly desirable that we cultivate and produce books of the first or primarily scholarly type, but it is clearly all the more desirable that we write books which, whatever else be said of them, are conspicuous successes in stimulating the rank and file of our students and in furnishing them with a proper "first approximation" to the first, or more profound type of book. The book before us by Professor Byerly is an excellent example of this second, or primarily helpful type. The students with whom we have just finished using it seemed dissatisfied in but one particular—they would like to have seen it carry the subject farther. Thus, they were really not dissatisfied at all, but merely unsatisfied. They enjoyed the text and they enjoyed the well-graded and abundant easy problems and they were on the whole the sort of happy graduate students which we like to see but seldom do, especially when the topic under consideration is as proverbially intricate as is the calculus of variations. The book is, as we have implied, as good a sample as one could desire of what our ordinary students need and really profit by after they have once acquired a fair knowledge of the calculus.

Some of the details of the book may now be mentioned. At the beginning the reader's attention is directed to a number of problems which instinctively interest him but which, as he can plainly see, cannot be solved by ordinary calculus, though they are closely related to it. This is made to suggest the general problem (minimizing an integral) which is now stated. As yet no problems have been actually attacked, but some intimation is now given of how it may be done, at least in certain noteworthy special cases. The reader follows the trend easily and with active interest. In fact, everything possible has been done to make it easy for him, the analysis following simple independent methods in which no use is made of the customary but puzzling symbolism common to the subject. All this comprises the first, or introductory chapter. Chapter II proceeds to explain the usual symbolism and technique—the use of the δ, the exact meaning of a "variation," etc. This done, there is a return to the unsolved problems outlined in the first chapter. They are now restated and taken up from the standpoint of the new symbols just explained. The matter of actually solving the same problems is even yet held in abeyance, at least in the main. By this time the reader is much interested and anxious to see what can really be done with such problems. The author, realizing this, proceeds at last to tackle them, showing incidentally how the symbolism just explained saves time and effort in the work and is therefore justified. The groundwork is now well laid and it remains for the subsequent chapters merely to develop the applications and generalize the ideas *in extenso*. Thus, Chapter III shows what becomes of the fundamental problem in three dimensions, pointing out some of the applications it then has in mechanics, notably in Hamilton's principle. Chapter IV shows what the same problem becomes for double integrals, again giving applications, notably to the determination of minimal surfaces. Chapter V considers the problem under the assumption that the limits of the integral may vary. Here again stress falls upon simple yet noteworthy applications.

Throughout are well-graded exercises which were greatly enjoyed and which seemed quite an innovation in a book devoted to so special and advanced a topic as the calculus of variations.

A number of minor corrections follow:
Page 24, line 8, change "order" to "degree."
Page 30, last line, numerator of first integral, change ∂ to δ.
Page 38, next to last line, change ∂ to δ.

WALTER B. FORD.

UNIVERSITY OF MICHIGAN,
August, 1917.

PROBLEMS FOR SOLUTION.

SEND ALL COMMUNICATIONS ABOUT PROBLEMS TO B. F. FINKEL, Springfield, Mo.

ALGEBRA.

492. Proposed by ARTEMUS MARTIN, LL.D., Washington, D. C.

If two numbers, A and B, $B > A$, be selected at random, what is the probability that they have no common divisor?

493. Proposed by ALBERT BABBITT, University of Nebraska.

Determine the coefficients b, c, d of the equation $x^3 + bx^2 + cx + d = 0$ so that they should be roots of the same equation. [From *Supplemento a Periodico di Matematica.*]

494. Proposed by N. P. PANDYA, Sojitra, India.

Solve algebraically and also graphically, $\log \sin x = \sin \log x$.

GEOMETRY.

524. Proposed by NORMAN ANNING, Somewhere in France.

Many railways use as "easement curve" the cubic parabola. If points on such a curve are named by their distances measured along the curve from the point of inflection ("flat end") show that, within the limits of ordinary practice, *i. e.*, for angles so small that the difference between arc and sine is inappreciable, the deflection from tangent at m to set n is $(n - m)(n + 2m)$ times the deflection from tangent at 0 to 1.

525. Proposed by C. N. SCHMALL, New York City.

Given a quadrant of a circle AOB, where OA and OB are bounding radii, and a semicircle ACO having OA as a diameter and lying on the same side as the quadrant. Describe a circle which shall touch the two arcs and the radius OB.

CALCULUS.

440. Proposed by JOSEPH B. REYNOLDS, Lehigh University.

If t is the differential vector joining two consecutive points on a space curve and R is the radius of curvature of the curve at that point, prove that

$$R^2 = \frac{(t \cdot t)^3}{(t \times \dot{t}) \cdot (t \times \dot{t})}.$$

441. Proposed by J. L. RILEY, Stephenville, Texas.

Find the minimum value of

$$\int \left\{ \left(\frac{dy}{dx}\right)^2 \sin x + (y + x - \sin x)^2 / \sin x \right\} dx.$$

MECHANICS.

356. Proposed by FLORENCE P. LEWIS, Goucher College, Baltimore.

A ray of light enters a prism having vertex angle α. If the angle between the incoming and the outgoing directions is defined as the angle of deviation, at what angle must the ray enter the prism in order that the angle of deviation may be a minimum?

357. Proposed by JOSEPH B. REYNOLDS, Lehigh University.

Two beads each of mass m connected by a string of length $2l$ and carrying a mass m' at its middle point are threaded symmetrically with respect to the major axis which is vertical on a